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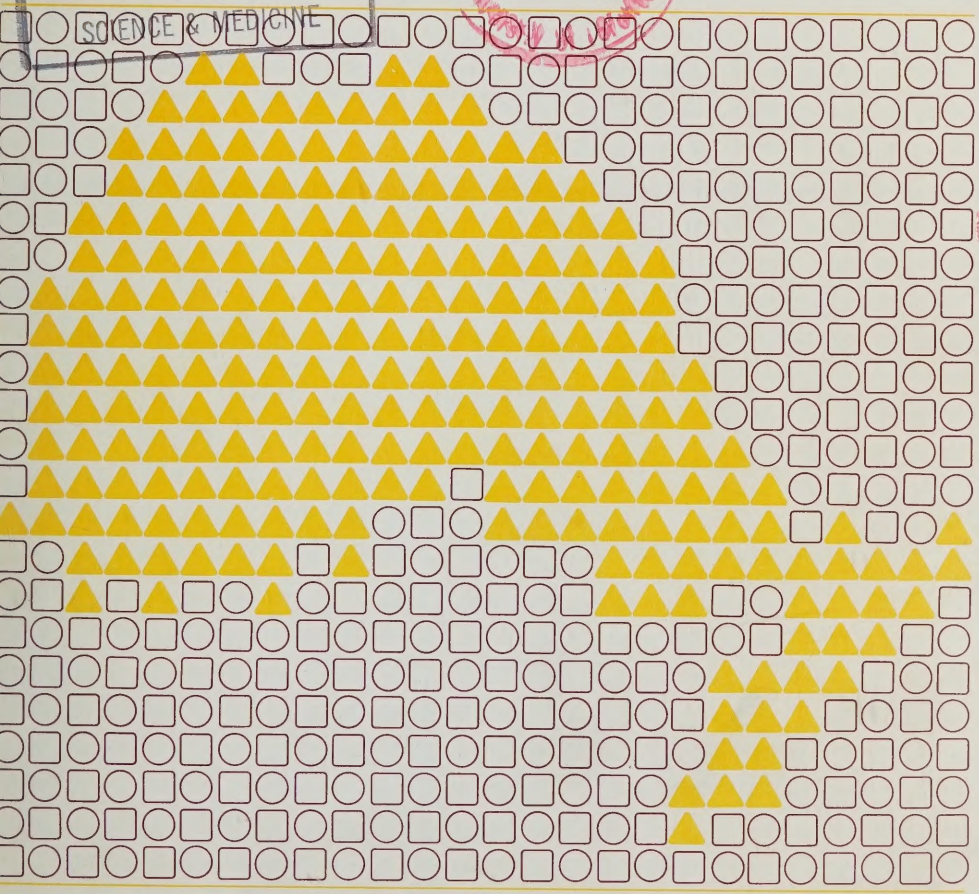
Occupational Health in Ontario

Volume 3, Number 4, October 1982

Lead in Indoor Pistol Ranges

Occupational Health: An Ontario Perspective



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1. Lee WR, and Miles S. Postgraduate preparation for occupational medicine. J Soc Occup Med 1976; 26:115-119.
2. Department of Health and Social Security. Notes on the diagnoses of occupational diseases, rev ed 1972; London HMSO.
3. Gamble JF, and Battigelli MC. Epidemiology. In: Clayton GD and Clayton FE. eds. Patty's industrial hygiene and toxicology. New York: McGraw Hill, 1978: Vol 1; 113-116.

W.R. Waddell, M.D.

Lead in Indoor Pistol Ranges

Summary

High air lead levels were almost universally found in a survey of the indoor pistol ranges of eastern Ontario. The blood lead levels in exposed range personnel were found to be generally low. Recommendations are made with regard to the practical control of the lead hazard in such ranges.

Introduction

High air lead levels in the indoor firing ranges of various Ontario institutions have been a periodic problem for the Ministry of Labour for many years. This problem was recently exacerbated when the Ontario *Occupational Health and Safety Act*[1] was enacted to cover additional workers, including the police. In addition, specific legislation regarding lead exposure[2] came into force in the fall of 1981. In an effort to assess occupational lead exposure in such ranges, a general survey of all the ranges in eastern Ontario was made between April 1980 and March 1981. This paper summarizes the findings of this survey.

Methods

Of the 13 institutional ranges in eastern Ontario, it was possible to investigate 12. Each was assessed with regard to: general range plan, ventilation design and capacity, housekeeping practices, respirator usage, 'normal' range usage and the medical surveillance program for range personnel, if any.

Using the approximate dimensions of each range and estimating its exhaust air volume from crude measurements, it was possible to make a rough estimate of the velocity of air being moved through the firing line using the formula:

$$\text{Velocity (ft/min)} = \frac{\text{exhaust air volume (cfm)}}{\text{range cross-sectional area (sq. ft.)}}$$

The general assessment was followed up in all 12 ranges by measurements of airborne inorganic lead particulate by technicians from the Occupational Health Branch. The sampling methods used for such measurements are specified in a Code of the Lead Regulations.[2] Similarly, the determination of lead on the air sampling filters was made by Occupational Health Laboratory personnel using methods specified in the Code. Each environmental sampling was done

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under conditions said to be typical of 'normal use' for that range. As exposure can occur at the firing line and/or in the control room, personal samples were taken in the breathing zone of both the shooters and the instructors in these areas. As most practice shooting in police ranges is of short duration, sampling times were kept short, averaging less than 20 minutes.

Finally, an attempt was made to gather and assess the results of any medical monitoring for lead. This proved somewhat difficult because such testing was on a voluntary basis at the time of the initial survey. All of the blood leads obtained were from 'range masters', who supervise range activities and, therefore, are the persons likely to be 'most-exposed' to range conditions. Because of the limitations stated above, the blood lead results came from a variety of laboratories and the timing of the samples was more or less random although most range masters are in the range on a regular basis.

Results and Observations

The following Table summarizes the results of the mean air lead levels, the estimates of air velocity at the firing line and the blood lead results which were obtained.

Most of the shooting during these tests was done with the standard issue .38 calibre service revolver, using unjacketed lead bullets. In the case of Range J, a .22 calibre revolver was used. It should also be noted that the shooting practice protocol in certain ranges (e.g.: Range L) is such that the rate of fire is relatively slow. Obviously biased values (e.g.: ventilation failure, the use of jacketed bullets, etc.) have been excluded from the calculation of these averages.

Reviewing the Table, it can be seen that a total of 73 samples were taken for airborne lead. The concentration of air lead ranged from 18.05 to 0.13 mg/m^3.

The estimated air velocities at the firing line ranged from 118.1 to 0.0 feet per minute.

A total of 31 blood lead determinations were made on 16 individuals in five different ranges. The blood lead results ranged from 0.54 to 0.01 mg/L with a mean of 0.18 mg/L. The blood lead level was said to be 'satisfactory' in two other individuals in two other ranges.

Table

Location	No. of Samples	Mean Air Lead (mg/m^3)	Estimated Air Velocity (ft/min)	Range Master Blood Leads (Mg/L)
Range A	13	18.05	2.5	0.13
Range B	9	7.64	3.6	–
Range C	8	6.96	118.1	0.01
Range D	6	6.08	40.0	–
Range E	4	4.57	12.1	–
Range F	10	3.45	7.4	(0.32; 0.04)
Range G	6	2.45	46.3	(0.12; 0.18; 0.16) (0.07; 0.15; 0.15) (0.13; 0.14; 0.10) (0.14; 0.16) (0.11; 0.14) (0.21; 0.18) (0.14; 0.16) (0.19; 0.22) 0.15; 0.09; 0.13
Range H	3	2.40	61.6	–
Range I	4	2.16	89.3	'satisfactory'
Range J	2	0.97	0.0	–
Range K	4	0.51	42.5	0.52; (0.27; 0.52; 0.54; 0.30)
Range L	4	0.13	47.6	'satisfactory'

Note: The values in parenthesis represent more than one blood lead determination in a single individual.

Discussion

In pistol shooting, lead dust and fume are known to be generated by four mechamisms[3]:

1) by the vaporization of lead from the base of the bullet by the heat of the deflagration of the propellant powder,
2) by the production of fine lead shavings when the bullet passes from the cylinder of the revolver into an imperfectly aligned barrel,
3) by the fragmentation of the bullet on striking the target and/or bullet trap, and
4) by the volatization of the lead styphnate used as part of the detonation system in the cartridge primer.

Bullets jacketed with copper or nylon have been used in an attempt to control lead emissions via the first two mechanisms. This solution has not been popular as it is expensive. The third mechanism is not of much importance to the shooter as the bullet trap is usually located 50 to 75 feet down range. However, it can come into play for range maintenance personnel involved with the periodic cleaning of the bullet trap. To my knowledge, the fourth mechanism has never been addressed by ammunition manufacturers.

In Ontario, the accepted TLV-TWA for lead dust and fume is 0.15 mg/m^3. The TWA-STEL is 0.45 mg/m^3.[2,4] Considering the nature of practice shooting, the TWA-STEL would seem to be the most appropriate reference value. Reviewing the mean air lead values in column 3 of the Table, it is seen that the only range which can satisfy the 0.45 mg/m^3 limit value is Range L, where the rate of fire has been noted to be very slow.

The average air lead figures in column 3 must be interpreted with some caution as they reflect many variables such as ventilation, housekeeping, rate of fire, number of shooters, type of weapon and bullet, etc. Range ventilation alone is complex and involves consideration of flow rates, uniformity of flow and the avoidance of an eddy effect in the breathing zone of the shooter. In addition, ventilation is complicated by the inherent nature of the shot from a firearm, i.e. the release of relatively large volumes of contaminated gas in a few milliseconds and the fact that the blast is not always unidirectional (e.g. side blast from the common service revolver). Because range to range variations are so great, it is emphasized that the air leads in the Table represent conditions *unique to that range*.

It is my opinion that these high air lead results should not be viewed with alarm. By its nature, practice shooting is intermittent and of short duration with long periods between sessions. Of all the ranges surveyed, only two (Range B and Range C) require the shooter to be present in the range for more than an average of one hour per month. However, significant exposure times are possible for some range supervisors. For example, six of the 12 ranges surveyed required the range master to be present in the range for 10 or more hours per month. Despite this, none of the range masters tested had a blood lead result indicating excessive lead absorption by Ontario standards (i.e. greater than 0.70 mg/L). In addition, an inquiry

of the Ontario Workmen's Compensation Board revealed no compensated cases of lead intoxication in range personnel in the past decade.

The NIOSH document 'Lead Exposure and Design Consideration for Indoor Firing Ranges'[3] recommends range ventilation which ensures the uniform distribution of air at a velocity of between 50 and 75 feet per minute at the firing line. Reviewing column 4 of the Table, it can be seen that these air velocities have been achieved in only three of the 12 ranges studied (Range C, Range H and Range I).

Examining the air velocity estimates in column 4, a wide range is seen. In general, the most poorly ventilated ranges have the highest air leads. The high air leads seen in the best ventilated range (Range C) are a paradox. An eddy effect in the breathing zone of the shooter secondary to the high air velocities in this range is a possible explanation for this result.

The blood lead results in column 5 seem quite low for a group occupationally-exposed to the high air leads encountered in this study. Assuming inhalation to be the most probable route of exposure and considering other factors (e.g. minute ventilation, transpulmonary absorption rates, etc.) to be equal, the blood leads should be a function of

a) the duration of exposure,
b) the intensity of exposure, and
c) the probability of alveolar deposition of the lead particles.

Comments have already been made on the first two factors. Muskett and Caswell's study[5] of lead in two small-bore ranges in the UK indicates that about two-thirds of the lead particles produced in a pistol-firing zone are between 1.1 and 7.0 μm in diameter. Particles of this size are known to be quite respirable and should be deposited in the alveoli, eventually to be absorbed by the body.

Possible explanations for the low blood lead levels observed are:

a) effective respiratory protection is worn,
b) supervision is done from a control room where air lead levels are low, and/or
c) the duration of exposure is short.

All three of these mechanisms could have been at work. The range masters in two ranges (Range D and Range F) routinely wear respiratory protection. Unfortunately, this protection was found to be not always of

a type approved for use with lead dust and fume. In addition, the use of respiratory protective equipment is not popular among the range masters, mainly because of interference with voice communication.

Separate control rooms were available in four of the ranges (Range C, Range G, Range H and Range I). These were not always used because personal contact is the favoured teaching method for most firearms instructors.

Exposure times to range conditions varied widely among the supervisors from one hour per year (Range J) to 240 hours per year (Range K), with a mean among 38 range masters of 53 hours per year.

In general, few range masters appreciated the role of ingestion in lead exposure. Few ranges forbad eating, drinking or smoking in the range and fewer still stressed practices of good personal hygiene.

Conclusions and Recommendations

This study suggests that a lead hazard probably exists in most indoor pistol ranges in Ontario and that the engineering control of this hazard is an imperfect art at the present time. As practice shooting is a mandatory requirement of many police forces, it is impractical to suggest that non compliant ranges be shut down.

Adequate hazard control can be achieved by the implementation of the following recommendations:

a) *Ventilation*

All indoor firing ranges should be provided with a tamper-proof system of mechanical exhaust ventilation. The ventilation design specifications outlined in the NIOSH Technical Information Document[3] or the ACGIH Manual of Industrial Ventilation[6] should be used as general guides.

The ventilation system should be activated whenever the range is in use. This can best be achieved by electrically interlocking the ventilation to the range-lighting system.

The ventilation system should be so maintained that it functions at design capacity. Its function should be assessed periodically by measurements of air velocity at the firing line.

In ranges where air is recirculated after filtration, the design should be such that an alarm is activated if and when filtration becomes ineffective. Such recirculation is not generally accepted as 'best practice'.

b) *Administrative Controls*
Lead exposure can be minimized by the use of outdoor ranges. The use of such ranges should be considered if facilities are available and weather conditions permit.

As the number of range supervisors is increased, each supervisor will be required to spend proportionately less time on duty in the range. In ranges with high air leads, this mechanism should be used to decrease individual exposure.

c) *Signage*
A sign warning of a possible lead hazard should be posted in all ranges.

d) *Personal Hygiene*
To minimize lead exposure by ingestion, range personnel should be instructed to maintain a high standard of personal hygiene and to wash before eating, drinking or smoking. No food, drink or tobacco should be kept or consumed in the range.

e) *Housekeeping*
To minimize the generation of air borne lead dust, the range should be cleaned on a regular maintenance schedule.

Cleaning procedures are facilitated by the presence of a smooth, seamless floor and the absence of superfluous fixtures. Vacuuming and wet cleaning methods are the only acceptable cleaning procedures. Dry sweeping should not be permitted. The presence of a floor drain facilitates wet cleaning methods.

f) *Respiratory Protection*
To minimize lead exposure by inhalation, the maintenance staff should wear respiratory protection during range cleaning procedures. Disposable dust masks approved for use with lead dust and fume would be suitable for this purpose. Supervisors should consider the use of such protection in high lead ranges.

g) *Medical Program*
The range supervisors and the range cleaning staff should be on a program of medical surveillance for lead. Such a program should follow the Code for medical surveillance in the Lead Regulations.[2]

References

[1]The Occupational Health and Safety Act, Statutes of Ontario, 1978; c 83.

[2]Regulation respecting Lead – made under the Occupational Health and Safety Act. RSO 1980, c321. Ontario Regulation 536/81.

[3]Anania TL, Seta JA. Lead Exposure and Design Consideration for Indoor Firing Ranges. Cincinnati, OH: NIOSH, 1975.

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Occupational Health: An Ontario Perspective*

Summary

Occupational health and safety conditions leading up to the enactment of the Occupational Health and Safety Act *and the establishment of the Occupational Health and Safety Division are reviewed. The influence of the Ham commission on the new legislation is described and the need for commitment to the Act by government, industry and workers to ensure its effectiveness is stressed.*

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Occupational health is far from a new subject. For centuries, certain diseases, or their physical manifestations, have been associated with particular occupations. Disease and, often, death were assumed to be the natural result of time spent in some kinds of work: coal miners got black lung; many boilermakers became deaf; textile workers coughed themselves into early graves as a result of inhaling large quantities of cotton particles; iron forgers suffered 'hammerman's paralysis'; laundresses suffered abnormally high rates of tuberculosis; chimney sweeps contracted cancer as a consequence of their exposure to coal tars; and 'ladies of the evening' not only risked venereal infection, they also got lead poisoning from the powdered lead in their cosmetics.[1,2] It is distressing to read of the horrible, lingering deaths from phosphorus necrosis (phossy jaw) endured by nineteenth century matchgirls or the agonies of twentieth century Canadian fluorspar miners suffering from silicosis or lung cancer.[3,4] More distressing still is the realization that some of the same forces which slowed or hindered improvement of workplace conditions in the nineteenth century pertain equally in the twentieth. Four principal attitudes have prevailed in both situations. Employers denied medical evidence of occupational hazards as long as possible and resisted efforts to force them to alter workplace conditions lest profits be cut; customers usually preferred a low price to the higher one which might result if production conditions were made safer; workers were prepared to accept risks when alternative sources of a livelihood were few or non-existent; and, finally, public opinion was only very tenuously aroused by what seemed to be an issue peripheral to many people's lives.

In the nineteenth century, public support was greatest for measures which would reduce the incidence of infectious disease, for it was soon learned how readily

*This paper was submitted to Queen's University as course material for the Masters in Public Administration.

disease could spread from mean streets to modish ones. In a similar vein today, some have argued that occupational health should be a primary concern to Canadians because workers, particularly those exposed to the ever increasing numbers of new chemical substances (over 2,000 new chemical compounds are introduced into industry each year),[5] can serve as the first line of defence for the larger community against the impact of environmental hazards. Hindsight now suggests that early action in response to the dangers to miners of asbestos might have reduced the risk to other citizens from the indiscriminate use of that substance in schools, offices, safety clothing, floor tiles, and the like.[6] Similarly, PCBs provide a now classic example of occupational-environmental health relationship: PCBs as a workplace hazard were inadequately regulated in the 1930s; today, the general public and the wider environment are suffering the consequences of that neglect.[7]

Occupational health, until recently, had a relatively low profile in a health care system which, as is readily apparent from the evidence, has been much more oriented towards illness than health. In the last few years, concern about the effects of toxic substances in the broader community has done much to raise 'the consciousness of workers and others to the dangers of industrial pollutants in the work environment.'[8] One author has clearly identified the reasons underlying the new concern with occupational health and with preventive measures:

> In protecting workers we have the only means of protecting the general public and the environment since by the time we appreciate workplace hazards with certainty it may be too late to protect anyone completely from the hazards by then incorporated into food chains and in nature generally. It may be too late as well in the political and economic sphere where the costs of restriction of the industry in question have become too high.[9]

Occupational health, then, is now seen as everybody's issue.

It was within the framework of this increased public concern that the Ontario government passed Bill 70, entitled *An Act respecting The Occupational Health and Occupational Safety of Workers*, which took effect

in the province from the beginning of 1979.* This legislation is, in many ways, one of the most progressive and potentially effective pieces of occupational health legislation currently in effect. The legislation was the end result of reports and hearings on the subject conducted in a number of different jurisdictions. In the United Kingdom in 1972, the Robens committee had investigated health and safety in the workplace; in the same year, Saskatchewan passed its Occupational Health Act; while in the following few years, the Science Council of Canada, the Quebec government and the Alberta government all conducted investigations into aspects of occupational health – into toxic substances, the asbestos industry and industrial health and safety respectively.[10-13] From these reports and legislative initiatives came some of the ideas and perspectives encompassed by the Ontario legislation.

In Ontario, the impetus towards new legislation came in the wake of the report of the Ham commission. This commission, which was appointed in 1974, owed its genesis to a combination of the government's minority position and the opposition's tenacious criticism. While the Ham commission was charged officially with the task of inquiring into the health and safety of workers in mines in Ontario, in reality it became an inquiry into the whole spectrum of health and safety in Ontario. Dr. James Ham's recommendations were far-reaching and, unusual in a royal commission report, couched in persuasive and, sometimes, passionate prose. The commission concluded that significant and sweeping changes were necessary in the general pattern of occupational health and safety programs in Ontario, not only because there were administrative weaknesses in the existing system, but also because public attitudes had changed. 'The acceptable levels of risks at work and in life-style are being redefined by society', Ham concluded in the commission's report.[14] In order to facilitate the process of bringing the law more into line with what he called 'the rapidly changing social perception of the importance of occupational health and safety',[14] Ham recommended three broad approaches to occupational health and safety legislation. First, he stressed the need for a more coherent, integrated governmental structure to

*Bill 70 became the *Occupational Health and Safety Act* when it was proclaimed on October 1, 1979.

deal with all aspects of work-related health and safety. Secondly, he recommended measures to rectify the 'serious lack of openness on matters of health and safety of workers.' A high level of secrecy had meant, for example, that the findings of a major report by the Ministry of Health on excessive levels of asbestos fibres in a mine near Kirkland Lake was made available to the company, but not to the union or the miners, and that the majority of information upon which the commission's report was based was inaccessible both to the workers and the public.[14,15] Finally, since there was inadequate opportunity for workers (who, after all, bear the brunt of the human costs of industrial society) to contribute their insights to the assessment of work conditions and little incentive for employees to play a part in health decision-making, Ham recommended that a mechanism should be devised to make possible worker participation in health and safety matters.[14]

The provisions of the new Act attempted to meet these three fundamental concerns. The Act established a new comprehensive and integrated Occupational Health and Safety Division as part of the Ministry of Labour, replacing a welter of often conflicting functions. A complicated jurisdictional tangle was thus unsnarled. As a piece of consolidating legislation, the Act brought together the occupational health and safety provisions which had been scattered amongst a variety of statutes, ranging from the *Construction Safety Act* to the *Pesticides Act*. More important, the new enactment amalgamated in the Ministry of Labour administrative and regulatory functions which had previously been part of the Ministries of Health, Labour, Natural Resources and the Environment. The diffuse nature of occupational health and safety administration had rendered many government initiatives ineffective; one branch might be able to conduct surveys or report on working conditions, but could effect no improvements if it did not have the ability to bring about reform or force adherence to regulations. In addition, there was no way of ensuring that some crucial areas were not omitted entirely. That this situation had existed for so long was emblematic of the market-oriented stance of the Ontario government, which preferred, where possible, to leave industry to regulate its own affairs. It was the failure of this 'self-regulating' approach which drew the greatest criticism from the Ham commission.

The locating of the new Occupational Health and Safety Division in the Ministry of Labour was not accidental. It was an affirmation that the health and safety of employees was best safeguarded within a department whose mandate was the welfare of working people. The change also reflected the Ham commission's agreement with the profound distrust held by labour unions of the Ministry of Natural Resources and, before it, the Ministry of Mines.[15] Unions,[15] it is clear, were actively suspicious of the relationship that existed between industry officials and the ministry's inspectorate – a relationship which they saw as excessively intimate. (The Ham commission characterized this association between industry and government as an 'accommodation of interests').[14] Some miners reported the practice of the ministry's inspectorate of sending someone ahead to alert the industry of an imminent inspection. Such practices were, however, less damaging to the workers than the general philosophy and overall orientation of the department. The Ministry of Natural Resources had, as its primary focus, the exploitation and development of the province's natural resources, a perspective which was liable to prejudice the interests of the worker. The Ham report found that since health and safety were a low priority in the ministry's hierarchy of objectives, the inspectorate was persistently inadequately funded and poorly staffed.[14] When other political jurisdictions encountered analogous problems of conflicting interests, several of them attempted to resolve the issue and simultaneously strengthen the political will to give higher priority and visibility to worker health and safety by combining the governmental agencies concerned and making them responsible to a Department of Employment or Labour. Thus, in creating its new Occupational Health and Safety Division, the Ontario government was able to draw on the precedents established by the United Kingdom, Sweden and the province of Saskatchewan.[8]

The second issue which the Act tried to confront was the need to establish a new climate of openness and public debate. The government's handling of the information at its disposal was repeatedly castigated in the pages of the Ham commission report. One example will suffice to illustrate the nature of the problem. The hearings of the commission established that, despite a considerable body of information on the dangers of silicosis in uranium mines, including the

establishment of maximum levels of radiation exposure by the International Commission on Radiological Protection, reports linking radiation to lung cancer, and considerable data on individual mines, levels of dust and radiation in Ontario's uranium mines still exceeded recommended levels. While the government, it seems, was very well informed about these hazards – quarterly readings taken by the industry were all sent to the government[16] – the problems remained unalleviated and both the public and the affected labour force were left in the dark about their existence. The Workman's Compensation Board might have been able to make the issue a subject of public debate. As a result of its careful record-keeping and research, it was in a position to build a cogent and convincing argument for the link between radiation and lung cancer in the uranium mines. That the board did not use its knowledge to push the case for improved working conditions is perhaps a reflection of the narrow way in which it interpreted its mandate. One board representative, when testifying before a legislative committee in 1974, stated that the Workman's Compensation Board never saw any reason to treat cases of industrially-induced cancer on anything but an individual basis.[16] The broader issue of health protection thus remained unaddressed.

In order to rectify some of these problems, the Act enacted several measures to increase the 'right to know' of both workers and the general public. Under the legislation, for instance, employers are required to 'keep and maintain accurate records of the handling, storage, use and disposal of biological, chemical or physical agents', and to keep and make available to workers records of the exposure of the worker to such agents.[17,18] Moreover, the new Occupational Health and Safety Division has stressed that its approach to its mandate will be characterized by openness and co-operation. One example of this more open attitude has been the establishment of an Advisory Council on Occupational Health and Occupational Safety consisting of members from management, labour and the public at large, which reports directly to the Minister of Labour. The body advises the government on matters of policy and makes recommendations on issues referred to it by the minister or others, and its reports are made public. Further, a variety of educative measures have been undertaken to make worker input more effective by 'upgrading the skills of work-

ers and supervisors in occupational health and safety' and, more generally, by fostering an awareness and knowledge of matters concerning welfare in the workplace.

Finally, and perhaps most interestingly, the Act has addressed the issue of worker participation in health and safety matters directly. The underlying assumption of this part of the legislation is that while regulation by inspectors is important, it is not sufficient to ensure safe and healthy working conditions on a day-to-day basis. All workplaces with 20 or more employees are now required to appoint joint labour-management health and safety committees. In a sense, the establishment of these committees can be seen as a way of reviving, in a more acceptable form, the principle of self-regulation.

This approach has significant potential benefits and some serious drawbacks. First of all, since each workplace is different, it can be argued that no system of blanket legislation can provide workers with adequate protection and that it is only those directly involved in the labour process who can appreciate fully the potential hazards which may arise on a day-to-day basis. It is here that joint committees can make their contribution. Secondly, the establishment of these committees, along with the provision to have worker representatives appointed as plant inspectors, can stimulate workers, both individually and through their union representatives, to become more attuned to the hazards inherent in the substances and processes with which they work and to learn more about the ever-changing and increasingly complex materials and machinery used in the workplace. Quite probably, the new legislation has had something to do with the concern recently expressed about the safety of prolonged work with video display terminals, for example.[19,20,21] Even more significant, legislative initiative has now given to all workers, by law, a measure of the health and safety protection hitherto available only to those workers (usually members of the largest unions) who had gained such benefits under the aegis of collective agreements. Strong health and safety legislation is particularly important in periods of economic recession – such as that prevailing at the present time – because it is in just such an economic climate that health and safety provisions are less likely to have a prominent place at the bargaining table, and that added

temptations may arise for management to skimp on safety in the interests of maintaining profit levels.

On the other hand, it is possible that joint health and safety committees may induce an emphasis on some aspects of occupational health to the detriment or exclusion of others. There is an obvious risk that labour-management committees will focus on disabilities of the type that can be best prevented by such co-operation; emphasis may be on trauma rather than disease, or on secondary methods of protection, such as special clothing, when fundamental research into production techniques which would not require so many toxic substances would be a preferable approach. Hazards readily recognized or remedied may receive positive attention now that health and safety committees are in place, but, conversely, those diseases a long time in the making (often the most serious) may be overlooked because they are less easily dealt with. Most important, the legal requirement for health and safety committees in businesses with 20 or more employees should not obscure the fact that concerns employing fewer people may present at least as many hazards. In addition, the workers in small firms are less likely than those in larger business to be unionized and to have the benefits of health and safety provisions, clinics, and the like, which unions have sometimes achieved for their members through collective bargaining.[22] The smallest firms are also those enterprises least likely to be visited very regularly by an inspector. Small operations may employ the most vulnerable workers, such as immigrant, temporary or unskilled workers, who are anxious for any available employment, and who are less likely to complain about hazards in the workplace. Finally, there is some evidence that one unintended consequence of the Act has been the farming out of hazardous processes to firms too small to require safety monitoring committees. One reported incident is highly informative about the impact of legislation which is less than comprehensive:

> Canadian General Electric used asbestos in several sections of its plant, but now has removed it almost entirely from its 4,000+ employee operation in Peterborough. It has subcontracted all asbestos work to small, non-unionized companies elsewhere in the Peterborough area, where employer and employee alike were eager for the new work which now dominates their operation.[9]

Finally, the Act provides the worker with the right to refuse work if he or she feels that any aspect of workplace conditions – 'equipment, machine, device, or thing' – is likely to be personally dangerous.[17] This measure represents a breakthrough in the protection of occupational health in that it allows work cessation for health and safety reasons: other work stoppages during the course of a collective agreement are illegal under the terms of the Ontario *Labour Relations Act*. A worker can now take the initiative to protect him or herself without fear of loss of wages or employment. This very tangible material benefit may also be accompanied by a salutary attitudinal change. Because of their enhanced power to act, employees may be encouraged to take a more active responsibility for monitoring and acting to maintain healthy conditions and practices of work. It has been suggested by one author that the 'right to refuse' clause can ultimately serve to undermine 'macho' attitudes on the part of some workers who not only tolerate, but often take pride in, labouring in harsh conditions or in insouciant ways.[6,9] A more safety-sensitive labour force may also come to make more assiduous use of safety equipment (although it should be recognized that cumbersome safety clothing and equipment are far from ideal means of coping with workplace hazards).

The right to refuse unsafe work, however, has not been greeted with universal acclaim. As with the health and safety committees, it has been suggested that obvious and immediate dangers will be overstressed; however, recent concern with the long-term hazards of working with substances such as asbestos would seem, to some degree, to contradict this observation.[6,23-26] Another concern has focused on the implications of the clause for industrial relations. Some concern has been expressed – largely by management representatives – that a legal right designed to safeguard the well-being of employees will be used either irresponsibly or as a weapon in industrial conflict. While the Act has not been in effect for long, there is, certainly, as yet, little evidence to suggest misuse of the provision. When the 'right to refuse' is accompanied by the 'right to know', that is, when workers are given clear and complete information about what is being done to remedy or investigate the conditions about which concern is expressed (as has been required by a number of Labour Board rulings

arising out of the application of this clause),[27] the chances of irresponsible use of the provision are much reduced.

The new legislation in Ontario has made considerable strides in enhancing the possibility of genuine improvement in occupational and (indirectly) environmental health in the province. However, the well-being of the labour force cannot be brought about solely at a stroke of a legislator's pen. A sophisticated and progressive legal framework is important, but meaningful improvement depends on much more. It depends on appreciating and attempting to come to grips with the complexities of the issues involved. For instance, accidents at work can be contributed to by fatigue, stress, inexperience, boredom and preoccupation with other problems as well as a broad range of structural, maintenance, or fortuitous material circumstances. Similarly, a variety of individual habits (tobacco-use, drug or alcohol-use, for instance), may alter or exacerbate the impact of hazardous conditions and processes.[28] Finally, no legislation can be effective without commitment to it on the part of government, industry and workers. The Act's success will depend on the extent to which the Ontario government is prepared to devote funds and manpower to enforcement and research. It will also depend on the co-operation of those industries in which hazardous conditions exist – and the economic and political power of such industries is enormous. Finally, success will depend on workers' attitudes towards workplace health issues and the priority given to such issues as compared to other concerns, such as job security. The roadblocks in the way of improvements in occupational health and safety, then, are many and substantial. Commitment to this objective is harder to sustain in a poor economic climate, and the worthy ideal of openness and consultation can slow to a snail's pace the process of making regulations (it has taken two years for the ministry to produce regulations concerning lead levels, for instance). In the final analysis, the greatest danger to occupational health and safety is inertia. One cannot but agree with the conclusion of the 1972 Robens report that, in the long run, apathy may be the main obstacle to improvement, and that 'the most essential need will be for sustained interest and initiative.'[29]

Acknowledgement

I would like to express my appreciation to Dr. R.E.M. Lees, for reviewing the original manuscript and for his helpful suggestions.

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A Unique Regional Agency

Summary

The Atlantic Foundation for Occupational and Environmental Health, a new non-profit organization committed to protecting the health of workers in the Atlantic provinces, is described.

A Halifax social worker just doesn't seem to have it anymore. For eight years she was able to handle the daily pressures and frustrations of working with the many clients on her enormous caseload; but now she is slowly being worn down. She doesn't have the enthusiasm of a few years ago. She's missing time at work, she's tense, she sits for hours at her desk day-dreaming. She is a victim of 'burnout'.

A production worker at a New Brunswick dairy is having hearing problems, though he doesn't know it. To communicate with his fellow employees over the din of the compressors, he has to shout. But, then, so do many of the other workers. His wife first noticed his hearing problem. One evening after supper she walked into the family room. The TV was turned up full blast. 'Jack, do you really need "M*A*S*H" on so loudly that the whole neighbourhood can hear it?' 'That's not loud,' he replied. 'Jack, I think you'd better see a doctor about your hearing.'

There is a simmering conflict at a small Maritimes pulp mill. The employees are worried about their safety when working on a newly-installed machine. 'Chopper' they call it. There's a lot of grumbling; rumours are spreading. The management says that the new equipment is, in fact, both safer and more productive than the machine it replaced. Studies prove it. 'Just try it out – I'll try it out – and you'll see,' says the frustrated production manager. However, the plant has neither an effective health and safety committee nor an occupational health service. Any possible dialogue between labour and management has ceased. The machine sits idle.

These are all typical occupational health and safety issues faced by employees and employers in the Atlantic provinces. To overcome these and similar problems, the Atlantic Foundation for Occupational and Environmental Health was established and officially opened in June 1981.

Since then, the Atlantic Foundation has hired a

growing staff of trained health professionals, opened its head office in Sydney, Nova Scotia as well as satellite offices in Halifax and Port Hawkesbury and is operating the first of two mobile testing vans. As well, a number of companies have contracted the foundation's services and various seminars and workshops in occupational health and safety have been conducted in Cape Breton and Halifax. Though less than a year old, the foundation's reputation is growing across the region.

'Occupational health is just opening up in Atlantic Canada; it's a very exciting field, and, so far, we are very pleased with the response from employees and employers to our initial programs,' says foundation president, Dr. Albert Prossin, of Sydney. 'They like the idea of a neutral outside agency coming in to work for the mutual benefit of both employees and their employer.'

Don Murtha agrees. He is the safety administrator of the Halifax Herald Ltd., and speaks highly of the foundation's operations. The newspaper brought in the foundation's mobile testing van to monitor the hearing of its press room employees. 'It was really very convenient. The foundation's staff parked their van outside our door, the fellows went right in to be tested and there was no lost-time whatsoever,' says Mr. Murtha. Other employers have given similar endorsements. Labour is also positive.

A non-profit organization initially funded by the Nova Scotia government and the Cape Breton Development Corporation, the Atlantic Foundation has five aims and objectives, says Doctor Prossin: 'To promote and protect the health of workers, to assist industries in developing health awareness programs, to monitor the workplace for health hazards, to train occupational health and safety professionals, and to establish an information resource centre.'

Why is occupational health and safety so important? 'Work must be another area where man has an opportunity to develop his full potential and reach the dignified position he was intended to take on,' replies psychologist Martin McNeil, an occupational human development consultant with the foundation. 'Whenever possible, we should encourage the employee to be creative and not be just an extension of a machine. It's not just the paycheque that gives a person a sense of

importance and fulfilment.' 'What's the use of producing goods if the producers end up unhealthy,' adds Doctor Prossin. 'Besides, a safe and healthy workplace is very cost effective.'

Such concerns about occupational health and safety launched the idea of the foundation several years ago. Monsignor Malcolm MacLellan of Antigonish, Nova Scotia, past-president of St. Francis Xavier University, was looking over the Cape Breton Development Corporation's highly-respected health services program, then directed by Doctor Prossin. 'Why can't other employees and employers, besides coal miners and DEVCO, have access to similar services?' Monsignor MacLellan asked Doctor Prossin. 'Human life is too precious to be wasted in industrial accidents.' Yet, both men realized most small industries couldn't afford such a full-time operation and the government might not move into the field in a big way for decades.

The Atlantic Foundation was created to fill this gap. Certainly, some myths exist about the scope of health and safety in the workplace and how big this gap really is. 'The occupational health nurse is not a first aider. And the days of sitting in a small office waiting for an accident to happen on the shop floor are long gone,' says Brenda Penny, the foundation's occupational health nursing consultant. 'It's not pink paint nor piped-in mood music that promotes good mental health in the office,' says Martin McNeil.

And the foundation's staff have found out that most employers and employees across the region also recognize that accident prevention and educational programs, not pink paint or hindsight, are the keys to a safe work environment. Based on this philosophy, the foundation is developing a wide range of programs tailored to the needs of specific companies and their own particular occupational health problems. Here are just a few examples:

- consultation on how effective a company's existing health and safety program is and the planning of needed changes. This may include assistance in the hiring and training of new staff, creating educational programs and setting up health and safety committees on the shop floor.
- using the foundation's mobile vans, on-site monitoring of hearing, vision and pulmonary function and taking various types of tests – ECGs, chest x-rays, urinalysis and blood.

- in-plant testing of dust, noise, illumination, chemicals, fumes and temperature.
- setting up counselling programs to deal with occupational-related problems such as stress and burnout, drug abuse and alcoholism, depression and break-downs in interpersonal communications.

The total hearing conservation program is a typical example of the foundation's work and its 'prevention is everything and the sooner the better' approach, as Educational Training Consultant Jean Rose puts it. The program involves several aspects. One is a scientific noise level survey to determine if a company has a noise problem; and, as all noises are not alike, the extent and specific type of noise. Employees may be asked to attach a device, called a dosimeter, to their lapels and wear it for a shift. These ingenious little instruments measure how much noise a person is exposed to over a given period. Preventive measures are discussed. These could include constructing muffling enclosures, putting machines on shock blocks or rotating staff so that no single employee is exposed to the maximum noise intensity for an entire shift.

Another critical part of the foundation's hearing program is an employee-employer educational session involving films and an informed two-hour discussion of the anatomy of the ear, the physics of noise, the proper use of ear plugs and mufflers, etc. Finally, there is hearing testing of all affected employees. Warns Jean Rose, 'A hearing loss induced by industrial noise is irreversible. Testing tomorrow may be too late.' The foundation's modern mobile testing van pulls up to a company's door, each employee's hearing is tested in the hearing booth, and a medical history taken. The results of the audiograms are shown to the employees on a confidential basis and, in some cases, a visit to a hearing specialist recommended. Follow-up testing may be scheduled. Within a couple of weeks, the entire process can be completed and both employees and their employer will know exactly what must be done to create a safe, hearing-protected work environment.

In addition to providing these services to companies and government agencies, the foundation presents various seminars, courses and workshops for occupational health professionals, trade unionists, academics, management groups and the general public. In Sydney,

the foundation operates a comprehensive occupational health and safety library and a computer that provides a bilingual electronic indexing of articles from the data base of the Canadian Centre for Occupational Health and Safety in Hamilton. Both are open to queries from the general public. In coming years, the foundation plans to enlarge its relationship with various universities and colleges across the region to assist in the training of occupational health professionals and to develop research projects.

Occupational health and safety may well become one of the critical social issues of the 1980s. The staff of the Atlantic Foundation for Occupational and Environmental Health, a unique and growing regional agency, want to be ready to make its contribution.

Book Review

Guidelines on Toxic and Hazardous Chemicals Used in Educational Institutions, July 1980.

Published by authority of the Minister of National Health and Welfare, Environmental Health Directorate, Health Protection Branch.

Available in Canada for $1.95 from Canadian Government Publishing Centre, Supply and Services Canada, Ottawa, Canada, K1A 0S9.

This booklet, published by the Health Protection Branch of the Canadian federal government, is a handy reference source for all who are interested in occupational health matters. As stated in the introduction, it is primarily intended for 'everyone involved in science programs in educational institutions ... (including) high schools, community colleges and universities.'

Basically, the booklet consists of a classification system for chemicals commonly found in educational institutions. Chemicals are classified as a) extremely dangerous, b) dangerous, c) caution needed, and d) minimal hazard; these classifications are defined in terms of toxicological criteria such as LD_{50}s, corrosivity, etc. Criteria for hazard ratings in terms of flammability, explosivity, reactivity and disposal are also presented, as well as a partial list of incompatible chemicals. The rating system is similar to the numerical rating system of 0, 1, 2, 3 commonly used by industry.

About half the booklet is made up of a table of chemicals commonly found in educational institutions with the above hazard ratings given in a numerical table. Here, the authors have switched to 1, 2, 3, 4, whereas they started out with a, b, c, d. The reason for this inconsistency is not clear. The most helpful part of the table is the detailed criteria given for disposal.

In summary, this booklet cannot, of course, supplant standard toxicological references. However, as an adjunct it appears quite useful not only for school boards and the inquiring public, but also for ministries. Its price makes it a source which could easily be recommended as a handout.

M. Roy

Publications Available from the Government Book Store

Publications under the Regulation Act vol. 112–39	
Revised Regulations of Ontario, 1980 Regulation 692/80 Industrial Establishments	$2.00
Revised Regulations of Ontario, 1980 Regulation 691/80 Construction Projects	$2.00
Revised Regulations of Ontario, 1980 Regulation 694/80 Mines and Mining Plants	$2.00
Regulation respecting Lead – made under the Occupational Health and Safety Act Ontario Regulation 536/81	$1.00
Regulation respecting Mercury – made under the Occupational Health and Safety Act Ontario Regulation 141/82	$1.00
Regulation respecting Vinyl Chloride – made under the Occupational Health and Safety Act Ontario Regulation 516/82	$1.00
Regulation respecting Coke Oven Emissions – made under the Occupational Health and Safety Act Ontario Regulation 517/82	$1.00
Regulation respecting Asbestos – made under the Occupational Health and Safety Act Ontario Regulation 570/82	$1.00
The Nursing Consultant	$2.00
A Guide to The Occupational Health and Safety Act, 1978	$1.00

News and Notes

Queen's University Spirometry Workshop, October 20-21, 1982

The Occupational Health and Safety Resource Centre at Queen's University is offering a two-day Workshop on Spirometry at the Donald Gordon Centre, Kingston, on October 20 and 21, 1982. Topics for this course include: Anatomy of the Lung, Physiology of Respiration and Occupational Lung Disease. There will be intensive practical spirometry sessions which will include: types of spirometers, how they work, what they measure, techniques of spirometry, calibration of equipment, subject management, use of bronchodilators, abnormal tracings, measurement of values and interpretation of results. For further information contact the Occupational Health and Safety Resource Centre, Queen's University, 25 Union Street, Kingston, Ontario. K7L 2N6.

Continuing Education in Occupational Health for Physicians

The Occupational and Environmental Health Unit, Faculty of Medicine, University of Toronto, is offering a Short Course in Occupational Health.

November 1-5, 1982
The Auditorium, St. Michael's Hospital Annexe
38 Shuter Street, Toronto

This is the second of a series of courses particularly designed to meet the needs of part-time physicians in industry.

Topics Will Include

The Practice of Occupational Medicine; Laws and Regulations; Workmen's Compensation Board; Employee Assistance Programs; Women in the Workplace; Record Keeping and Confidentiality; Sources of Information; Current Issues in Occupational Health.

Areas of Concentration Will Be

Toxicology including solvents, heavy metals, carcinogens, mutagens and teratogens, biological monitoring, chemical control programs and waste disposal.

Respiratory Diseases including respiratory physiology, pulmonary function testing, immunology and pulmonary allergy and occupational dust diseases.

Noise Induced Deafness including physiology and anatomy of the ear, audiology, industrial audiometry and hearing conservation programs.

Ergonomics dealing with physiology of work, pregnancy and work, visual display units and manual lifting.

Dermatology in Industry dealing with the skin as a defence mechanism, allergic and irritant dermatitis, clinical testing and preventive measures.

Registration Fee: $375.00. Pre-registration Advisable

Contact Person: Dr. Valerie Alcock, Continuing Education Director
Tel. (416) 978-4521

or write: The Occupational and Environmental Health Unit,
The FitzGerald Building,
Faculty of Medicine,
150 College Street,
Toronto, Ontario
M5S 1A1

Academy of Medicine — Occupational Health Sections

The provisional program for 1982-83 is as follows:

October 18, 1982	Joint meeting with Ophthalmological Section. VDT effects on the eye.
November 4, 1982	To be arranged
February 3, 1983	To be arranged
March 2, 1983	Ministry of Labour, Occupational Health Laboratory tour
May 5, 1983	Emotional Instability
June 2, 1983	Annual Dinner

University of Toronto — AIHF Award

The University of Toronto will be one of 10 universities to receive a fellowship award for the 1982-83 school year from the American Industrial Hygiene Foundation (AIHF). The AIHF is awarding a total of $50,000 in fellowship grants for the support of worthy students pursuing masters' degrees in industrial hygiene.

Professor J.W. Smith, Director, Occupational Health and Safety, said 'This award is clear recognition of the excellence of the co-operative program offered by the Department of Chemical Engineering and Applied Chemistry and the Occupational and Environmental Health Unit at the University.'

The other nine recipients of AIHF grants are: the University of Alabama in Birmingham, University of California, Berkeley, University of Cincinnati, University of Illinois, University of Michigan, University of South Carolina, University of Utah, Temple University and Texas Tech University.

This is the first year the AIHF has awarded fellowship grants.

Paul E. Toth, AIHF president, said he is 'extremely pleased with the support our program has received from major corporations and AIHF members. In our first year of annual fund activities, we're able to provide fellowships at 10 major universities, which is certainly something to be proud of.'

The AIHF has received gifts from major corporations and American Industrial Hygiene Association members, including Union Carbide Corp., Dow Chemical Co., ASARCO, Inc., Mine Safety Appliances Co., Upjohn Co. and Kemron Environmental Services.

The AIHF was formed in 1979 by the American Industrial Hygiene Association to help increase the number of qualified professional industrial hygienists by providing graduate fellowships for students at major universities throughout North America.

Industrial hygienists are the occupational health specialists who work in industry, government, academic institutions and private firms to recognize, evaluate and control potential hazards in the workplace.

The award announcement was made during the 1982 American Industrial Hygiene Conference in Cincinnati, June 6-11.

Sixth International Conference on Pneumoconioses

The Sixth International Conference on Pneumoconioses organized by Bergbau-Berfusgenossenschaft in collaboration with the International Labour Office and with the participation of World Health Organization (WHO) will be held in Bochum (Federal Republic of Germany), September 20-23, 1983, under the patronage of the Minister of Labour and Social Affairs of the Federal Republic of Germany.

The previous five ILO International Conferences on Pneumoconioses were held in Johannesburg in 1930, in Geneva in 1938, in Sydney in 1950, in Bucharest in 1971 and in Caracas in 1978.

Agenda of the Conference:

I. Current Concepts on Pneumoconioses Etio-Pathogenicity;
II. Epidemiology of Pneumoconioses; Occupational Exposure and Health Effects of Mineral Dust;
III. Criteria and Methods for the Assessment of Airborne Particles in the Working Environment;
IV. Policies and Strategy in Reducing and Eliminating Risk.

Working Group No. 1: Respiratory Function Tests in Pneumoconioses;

Working Group No. 2: Research and Training Program on ILO International Classification of Radiographs of Pneumoconioses.

Round Table Discussion A: Lung Cancer Related to Pneumoconioses;

Round Table Discussion B: Pneumoconioses, Chronic Bronchitis and Emphysema.

Working Languages: English, French, German and Russian.

Other Information:
Further information concerning participation in the conference may be obtained from the Chairman of the National Organizing Committee at the following address:
Prof. W.T. Ulmer,
Bergbau-Berufsgenossenschaft,
Silikose-Forschungsinstitut,
Hundscheidstrasse 12,
D-4630 *Bochum 1*
(Federal Republic of Germany)
Tel.: (0234) 302 400.

Provincial Lottery Grant Funds for Occupational Health and Safety

The Ontario Minister of Labour, the Honourable Russell H. Ramsay, has announced that two million dollars worth of provincial lottery grant funding had been made available for Occupational Health and Safety training and research.

The funds are part of a provincial grant system that the Ministry of Labour has used extensively in previous years.

The minister announced a major new initiative to be funded this year: *the Northeastern Ontario Occupational Health and Safety Resource Centre*, to be *located in Sudbury*, and operated jointly by Laurentian University and Cambrian College of Applied Arts and Technology.

The Sudbury centre will provide occupational health technical consultation and advice, testing services, and training for the northeastern region of Ontario, and will offer particular assistance to smaller industries. The Sudbury centre complements the services being provided throughout Ontario by four other existing centres, located at the Universities of Western Ontario and Waterloo, and at Queen's and Lakehead Universities.

The Minister also stated that Health and Safety training initiatives have been undertaken with the Ontario Federation of Labour and with the Labour Council of Metropolitan Toronto. 'The OFL project will provide health and safety training to worker representatives who, under Ontario's occupational health and safety legislation, share significant responsibilities in the monitoring and development of safe workplaces. By late 1982 it is anticipated that 360 instructors and 3,600 representatives will have graduated from the program.'

A grant program to be undertaken by the Labour Council of Metropolitan Toronto will provide occupational health and safety training material addressing the particular needs of employees who are recent immigrants.

The major health study of diesel emissions in mines, currently underway with the joint participation of Canadian and United States federal agencies, will continue.

There will also be continuation of the Universities of Toronto's and McMaster's occupational health training programs.

Mr. Ramsay emphasized the significance of the lottery grant funding. 'Over the past four years, the Ministry of Labour has channelled over eight million dollars into major training and research endeavours in occupational health and safety, and this has allowed a continuity of focus and effort.

'This funding allows important research and training programs to be carried out by various agencies including labour organizations, university research facilities and professional health and safety organizations. The numerous projects set in motion by the provincial lottery funding are making increasingly important contributions in furthering our knowledge of complex technical questions regarding workplace health. In addition to increased understanding of potential health effects and preventive measures, these programs significantly assist the training of health and safety professionals in Ontario.

'Those benefiting from the training programs currently in place through the grant system include employee and employer representatives, undergraduate and graduate university students proceeding to professional occupational health and safety certification, and members of the medical and nursing community who require additional training in occupational health medicine,' the minister said.

Applied Research Projects

Grants in this area include ongoing projects in the development of equipment for detecting and measuring hazardous fumes and for a study of the control of underground diesel emissions. New projects have to do with studies in lead poisoning, safe levels of exposure to dusts, the rapid analysis of chemical carcinogens and a major study of the relationship of silicosis to environmental exposure to silica dust. The specifics of these studies are as follows:

University of Toronto	Development of Stain Length Passive Dosimeters
Ontario Research Foundation	Emission Control of Underground Diesels
Carleton University	Correlations between Improved Tests for Lead Burden and Lead Intoxication
University of Toronto	A Rapid Bioassay for Chemical Carcinogens
McMaster University	Lung Dust Study of Post Mortem Lungs of Occupationally Exposed Workers
University Hospital of Western Ontario	Effect of Exercise on Regional Deposition of Particles
McMaster University	The Relationship between Environmental Exposure and Silicosis

Bursaries

These funds are used to enable individuals to undergo technical and professional training in occupational health and safety courses.

The bursaries are granted twice a year, and 24 have been awarded as a result of applications received as of this date. These bursaries cover technicians' courses in community colleges, post-graduate training at the master's level in universities and diploma courses for health professionals provided by McMaster University in Hamilton.

Support for Existing Resource Centres

The existing centres at Western, Waterloo, Queen's and Lakehead Universities provide consulting, information, testing, training and evaluation services to workplaces on matters relating to occupational health and safety. During the first three years of the existence of these centres, lottery grants totalled nearly one and one half million dollars.

Laurentian University/Cambrian College Resource Centre
As detailed previously.

Instructor Training – Ontario Federation of Labour
As detailed previously.

Health and Safety Training – Labour Council of Metropolitan Toronto
As detailed previously.

Advanced Training – University of Toronto and McMaster University
To increase the availability of skilled health and safety professionals, support will be continued for both undergraduate and graduate level courses in occupational health and safety at these two universities. Last year approximately one half million dollars worth of lottery funding was awarded to these two universities.

Occupational Health Nursing Program – Mohawk College/McMaster University
This program offers evening classes in occupational health in nursing to persons already qualified as registered nurses.

Occupational Health Nurses Association – Development of a Certification Examination Process
This program advances the establishment of specialized certification in the occupational health area.

Coming Events

October 4–8, 1982	Five-day International Conference on Fibrous Dusts, Strasbourg, France
October 14, 1982	World Congress on Diseases of the Chest, Toronto, Ontario
October 25–29, 1982	Ontario Occupational Health Nurses' Association Conference, Niagara Falls, Ontario
March 24–25, 1983	Society of Occupational Medicine Spring Meeting, London, England
May 8–13, 1983	10th World Congress on the Prevention of Occupational Accidents and Diseases, Ottawa, Ontario
July 19–22, 1983	Second International Conference on the Clinical Chemistry and Chemical Toxicology of Metals, Montreal, Canada
August 28–September 2, 1983	American Chemical Society Symposium on Chlorinated Diseases and Dibenzofurans in the Total Environment, II
September 5–10, 1983	XXI International Congress on Occupational Health, Dublin, Ireland

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